A Newsletter of the Local Technical Assistance Program **(LTAP)**

T2 Bulletin

Issue 61, Winter --1999

YOUR NEW T2 CENTER!

(from left to right) Paul, Roger, Darlene, Laurel, and Dan

We'd like to introduce ourselves. We're your new Northwest Technology Transfer Center. We have a new director, new staff, and an expanded program. With the retirement of George Crommes, Dan Sunde was selected to receive the baton as the new director. Formerly of the WSDOT-TransAid Management Systems Office, Dan is a 20-year veteran of the WSDOT with seven years experience in bridge design and maintenance, eight years in construction program management, and five years in inventory, pavement, and safety management systems.

Along with the new director comes a whole new look to the Northwest Technology Transfer Center. We have added two new positions we're calling Technology Transfer Engineers, filled by Paul Sachs and Darlene Sharar. Their primary mission is to provide you general engineering and technical support. Their role is to provide training and act as your eyes and ears in discovering and disseminating the most current information to help you do your job better.

Paul comes to us from the TransAid Management Systems Office and his specialty will be in pavements. He is both a nationally and internationally recognized figure in local agency pavement management with several articles and papers published. Paul has been a leading figure in the

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The Northwest Technology Transfer Center TransAid-WSDOT

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development of local agency PMS over the past 12 years and is the chair of the Transportation Research Board's national subcommittee on Local Agency Pavement Management.

Darlene has been with the WSDOT for 17 years with extensive experience in field work, including surveying, paving operations, and material testing. For eleven of those seventeen years she designed signals and illumination. Most recently she has become the "guru" of roundabouts and is currently writing a guide on roundabouts for local agencies. Darlene's main focus will be on the Local Agency Safety Management System, and Traffic and Safety issues. (For more see T2 Personal Profile later in the Bulletin).

The fourth new member of the team is Roger Chappell, the T2 Technology Integration Specialist. Roger is our techno-nut that lives and breaths all kinds of hitech stuff. He is originally from the WSDOT Transportation Data Office and was the technical "brains" that made DOT's very successful SRview video imaging platform work. Roger will provide support in Geographic Information Systems (GIS), Global Positioning Systems (GPS), Internet information systems, and digital imaging platforms. (We plan on Roger being veeeeery busy).

Laurel Gray is the lone "old-timer" remaining in the Center but her duties are now specialized in the area of training coordination. She has been with the T2 Center for six years providing the T2 training support functions. She will be your primary contact for training that is currently available, requests for new training, and feedback on past training.

And last, we have the seasonal Road Show Trainer that will continue the popular Road Show Program.

If you have any questions to ask or ideas you would like to see the Center pursue feel free to give us a call. We're open to new ideas and have a very strong desire to provide you the tools and information that helps you do your job better. We view the NWT2 Center as more than a source to present you information from the "outside". We also see ourselves as an information exchange center where we collect the new things you discover and broadcast them to your counterparts in other local agencies who can also use them.

So give us a call at:

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EQUIPMENT REPLACEMENT IS IMPORTANT TO YOUR SUCCESS

Phil Barto, P.E., Operations Engineer
Spokane County

How do you decide when to replace your heavy equipment?

Do you replace it while it is fairly new and requires few, if any repairs? Do you replace it when you anticipate a major failure, and save the cost of an engine, transmission, or hydraulic system overhaul? Or do you replace it when the machine is nearly "used up" and you expect a non-repairable failure? There are many ways to do it; and any of them can be right under different circumstances. But what happens all too often in government is that equipment is replaced when there is extra money in the budget or a total failure occurs. These are always the wrong times.

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It's always a guess to pick the optimum replacement time because even under the best of circumstances we look at past history, apply judgment, and predict a future event. There are some things to consider, though, that can help you make your decision and justify your recommendations when budget time rolls around. These are depreciation, operating costs, repair costs, functional obsolescence, crew standby costs, and whether or not the machine is right for the job. Let's consider them.

Things You Should Consider

Depreciation

Depreciation is the loss of value due to age and condition. It is frequently the most expensive component of the equipment cost. For example, a modern ten-wheel truck can cost around $70,000 to $80,000, and it will lose 50% of its value in the first five years. If the usage is 10,000 to 20,000 miles per year, which is typical for a government agency, depreciation cost is about the same, or even a little more than the repair cost. Think about depreciation carefully when deciding the trade-in time. The longer you keep it, the lower the depreciation cost. Ordering equipment that is comparable to the equipment that others in your area use can increase resale value. Stay away from unpopular options, especially when buying trucks. Of course, good maintenance and good maintenance records also help.

Stay away from unpopular options, especially when buying trucks.

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Operating Costs

Operating costs are the cost of fuel, lubrication, and expendable parts, such as tires and cutting edges. Technology is improving quickly. These days it is sometimes better to trade early and absorb the extra depreciation cost to reduce fuel usage, lower tire costs, or take advantage of some other savings. Don't count on being able to do this too often, though.

Maintenance and Repair Costs

Maintenance and repair costs are self explanatory, but the reasons for high maintenance costs aren't always easy to discover. Sometimes they are caused by poorly built equipment, and this can happen often if you aren't careful with your specification writing. High maintenance costs are more frequently caused by using the wrong equipment for the job, lack of preventive maintenance, "make do" repairs, or operator abuse. Most of you can probably remember all of these cases having happened at some time. Maintenance costs are a major expense. If you can't control them, early trade off of the equipment is a good idea.

Functional Obsolescence

Functional obsolescence has become an important factor since the technology revolution of the 1980's. A piece of equipment that was right for the job back in 1972 may not be right in 1999. Everyone must be more efficient today and that takes modern equipment. If you want to improve efficiency, it might be a good idea to replace outdated equipment earlier than you planned. Frequently, you will find that it is less expensive overall when you consider the increased productivity offered by some new equipment.

Crew Standby

Crew standby is the wasted time and lost productivity while your crew is either waiting on repairs, or slowed down by inefficient equipment. These costs don't show up in the equipment cost file, and they are hard to measure.

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Every Road Superintendent knows about these costs, especially if they are caused by a snow plow truck breaking down on the mayor's street! They are very real and very expensive, especially when a 20-person crew is involved.

Proper Application

Proper application is difficult to recognize and evaluate. It is obvious that trying to plow snow on a 50 mile per hour highway with a two ton truck is an improper application. But it isn't so obvious whether you should be using a 30,000-lb. excavator or a 40,000-lb. excavator for your work. It is important to select and use the appropriate piece of equipment for the job if you want to be efficient.

So, what should you do?

Select the Right Equipment

There are several things. First, buy the right equipment for the job. Take the time to think about what you will be doing and what equipment you should have. Remember that there is no such thing as one piece of equipment that is perfect for every job.

> ***...there is no such thing as one piece of equipment that is perfect for every job.***

If you try to set it up to do every job, you may find that it doesn't do any of them very well.

Instead, select the 1, 2, or 3 most important jobs and buy the best equipment for those purposes. It will probably still do an adequate job on the secondary duties. Remember that spending a little extra money at purchase time is a bargain if it gets you the right equipment for the job. You will own that equipment for a long time!

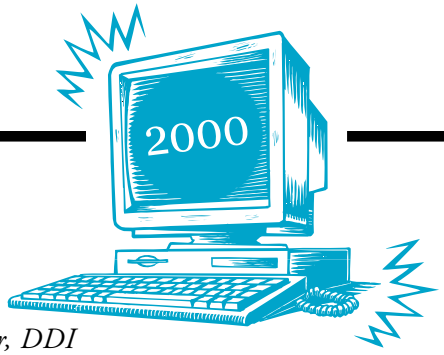
Take Care of It.

If you are going to spend all of that money for the right equipment, take good care of it. Meet all of the manufacturers' maintenance recommendations. And I highly recommend a good preventive maintenance inspection and repair program. It should be one that will identify potential problems and fix them before they cause a breakdown out on the road. It takes time to do a good preventive maintenance program, but it is always less expensive to do scheduled maintenance than to wait for the failure and do a field repair.

> ***...it is always less expensive to do scheduled maintenance than to wait for the failure and do a field repair.***

It makes good sense to stretch your equipment service life as long as possible if you can do it without causing an excessive loss in crew efficiency. This is the age of the shrinking dollar and increasing demands, and everyone is trying to do more with less. Smart equipment management is an important part of doing more with less.

Phil Barto is a Civil Engineer, licensed in California and Washington, with a background in equipment operation and maintenance. He is the Operations Engineer at Spokane County, a part time management consultant, and a member of the T2 Advisory Board.



YEAR 2000 CONTINGENCY PLANNING GUIDELINES

Source: WSDOT Contingency Planning Guidelines, Beth Glander, DDI
Edited by Roger Chappell, Technology Integration Specialist
WSDOT-NWT2 Center

Although a lot of effort is being expended to assure that Year 2000 related problems will be resolved before January 1, 2000, it is almost inevitable that some things will be overlooked or not completed on time. Keeping this in mind, it is critical that well defined and executable Contingency Plans be prepared in case system corrections are not completed on time or some part of a system is overlooked. Good back-up plans are essential to insure that your agency business will proceed with minimal disruption.

There are two types of Contingency Plans:

a) Risk Management Plans

These plans lay out computer system workarounds to be used if a system failure occurs as a result of Y2K corrections to a computer system not being completed on time. An example of this would be that in 1999 it is discovered that an overlooked code has serious problems and there is not enough time to complete the reprogramming to bring the software into Y2K compliance.

Plans should be developed for mission critical agency processes and any other systems identified as important to the operation of the your agency's business. These plans should be developed by your Information Systems (IS) personnel in consultation with the departmental system users.

b) Failure Recovery Plans

These plans lay out steps to deal with unforeseen operational problems if a Y2K related system failure occurs, such as power outages, equipment not functioning properly, system crashes, bad data, loss of communication, etc. This could occur with systems that were thought to be compliant but some piece of it was overlooked and not updated.

These plans are developed by the user organizations in consultation with the IS personnel. Contingency plans should include backup plans for not only equipment failures within the agency's operations but failures in supply deliveries from outside organizations...i.e. power, fuel, communications.

The scope of both types of Contingency Plans should include:

1) clear statements, including how long the contingency is to stay in place
2) carefully defined priorities that are agreed to by all parties concerned
3) cost estimates to set up and implement the plans
4) clearly defined responsibilities and roles
5) dates and signatures of upper level management within the organization

There are three phases for both types of Contingency Plans: Planning, Execution, and Recovery

PLANNING

1. Identify systems and likelihood of failure due to Y2K

-Identify mission critical business functions

-Identify systems supporting the mission critical business functions

-Assess probability of system failure due to Y2K problem

- Consider the reliability of the system's Y2K certification. (Is the system certified by independent entity, by a vendor, or is the compliance certification unknown?)

-Identify potential failure modes

-loss of electrical power

-loss of environmental controls

-breaches of security

-interruptions of internal communications

-interruptions of external communications

-system hang-up or shutdown
-degradation of performance
-erroneous or irrational data presented to users
-produces results with incorrect but acceptable errors
-files corrupted or lost
-unreliable/unpredictable results

2. Evaluate potential "triggers" to initiate implementation of contingency plans

-Replacement or repairs not completed by a specified milestone date
-Significant and repeated schedule slippages
-System believed to be compliant encountering date problems
-Date problems encountered earlier than expected
-Interface between two systems is non-compliant

3. Identify potential impacts

-Financial
-Legal
-Operational (how agency business processes will be impacted)
-Regulatory (state and federal regulations)
-Environmental (power, fuel, communications, transportation, etc.)
-Life

4. Set up a Crisis Center

-Communications
-Personnel support (people, cots, typewriters, trucks, refrigerators, etc.)
-Help Desk

5. Develop Contingency Strategies

-Establish dates that the system could experience problems (Time Event Horizons)
-Establish criteria for declaring implementation of a contingency plan
-Define drop dead remediation/replacement milestone dates for computer systems and electronic equipment
-Develop procedures for activating contingency alternatives
-Decide on "centralized" control vs. decentralized action
-Define control structures:
-Crisis Management Teams
-Infrastructure Teams
-Departmental Action Plans
-Define manual workarounds
-Provide backups for telephones and computers

6. Designate roles, responsibilities and authority of managers, production support analysts, developers and users

-Identify where roles and responsibilities are different than normal
-Establish list of procedures for emergency notification of all affected personnel

7. Establish support agreements as required

-To maintain communication equipment operational (e.g. phone, radio)
- To establish a standby back-up site (CAUTION: The backup site may also be affected)
-To "partner" with another Transportation or Public Works organization
(CAUTION: The partnering organization may also be affected.)
-to provide on-site technical support from staff, vendor or contractor
-To establish a Y2K help desk
-To develop contingency plans for systems that interface with your systems

8. Consider potential security breaches

-Password maintenance
-Physical access to systems and facilities

9. Identify ways to preserve and protect system data

-Back up computer data before date problems occur (CAUTION: The backup systems themselves may also be affected.)
-Make printouts of all databases.
-Manually review all computer system output and external interfaces input.
-Manually check all equipment with embedded chips for proper operation.
-Establish Y2K help desk as part of Crisis Center.

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10. Designate roles, responsibilities and authority of user organization

-Identify the chain of command and who does what.

-Identify where roles are different than normal operations.

-Establish lists and procedures for emergency notification of personnel

11. Identify emergency alternative procedures during contingency

-Change the method of date calculation or representation

-Disable non-critical processes, functions or subsystems that are non-compliant

-Use of word processors, copy machines, fax machines, etc.

-Over ride and perform the operation of a failed system manually

-Call in appropriate personnel as needed

-Shift communication channels to alternatives as needed

-Transfer the function/mission to another organization (CAUTION: Other organization may be similarly affected.)

-Establish procedures to complete corrective action on an emergency basis

-Set the internal date of the computer backward (such as 28 years which simulates the year 2000. See your computer support person for intructions.)

12. Develop and prioritize recovery procedures for contingencies

-Establish process for returning to normal operations

-Prioritize which systems should be addressed first

-Develop procedures to restore/restart systems as required

-Develop procedures to check system functions/ data

-Develop procedures to correct and restore corrupt/ lost data

-Identify criteria for judging when a system is classified as fully operational

13. Develop and perform training for implementing the Contingency Plan

-Identify training needs to carry out plans

-Practice/test each contingency plan to reduce risks during actual execution

-Estimate costs to set up and implement each plan

At the end of the Planning Phase you should have lists and procedures to execute before, during and after Y2K related failures.

EXECUTION

1. Monitor computer systems and agency operations for specific "contingency triggers," such as, repeated schedule slippages of Y2K system updating projects.
2. Execute specific risk contingency plans as required.
3. Check system functions and judge results, using the plan to determine the next steps.
4. Notify appropriate authorities of the nature and scope of any problems.
5. Maintain manual logs, as required.
6. Minimize threat to life and property.
7. Minimize damage to equipment.
8. Minimize damage to data.
9. Modify and improve the contingency plans as needed.

RECOVERY

1. Execute post-contingency plans as required.
2. Restore and restart systems as required.
3. Check system functions and results.
4. Correct and restore corrupt and/or lost data.
5. Notify appropriate authorities of resolution of problem.

GENERAL RECOMMENDATIONS

A Contingency Plan guidance document should be provided to every organization, especially those performing "mission critical" agency processes.

Every "mission critical" computing system should have a Contingency Plan. Current disaster recovery plans can be used if they meet the requirements.

Each Contingency Plan should include a high-level date and signature, along with approval and buy-off from appropriate authorities.

It is very important to assure that personnel participating in the contingency plan are appropriately trained and educated on the plan.

COMPREHENSIVE LIST OF POTENTIAL Y2K PROBLEM DATES

Source: Beth Glander, DDI
Edited by Roger Chappell, Technology Integration Specialist

WSDOT-NWT2 Center

Evaluating your agency's systems for Y2K compliance should include testing a number of critical dates to ensure proper operation prior to, on, and after January 1, 2000. The algorithms of systems and chips need to be tested for both forward and backward processing of time related data.

Not all systems need to test for all dates listed since not all fiscal years are used or international interfacing is not a part of your operations. Different application domains may have special significant dates like the fiscal year for various government agency systems. It is up to the program managers to determine which are most likely to impact their systems.

The Dates to Test

Here is a list of the most critical dates that should be considered for testing for Y2K compliance:

April 9, 1999	A system looking for Short Julian days might stop since this is day 99 of year 99 (9999).
July 1, 1999	Fiscal Year 2000 begins in 46 U.S. states, **including the state of Washington.**
August 21, 1999	GPS receivers use a 10-bit field for weeks since January 5, 1980. To get the current date, they compute the days since the base date and divide successively to get the increments for year, month, and day. Given the limit to 1024 weeks, input values at receivers using the 1980 base date will roll over at midnight on August 21, 1999.
August 22, 1999	The overflow of a week counter (e.g., Global Positioning System (GPS)). Uncorrected GPS think it's 1980-01-05.

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September 9, 1999	To account for "Date Packing ", check to ensure the (9/9/99 or 9999) digits "99"or "9999" do not trigger a red flag, result in erroneous branching, or otherwise cause a processing error. ("Date Packing" is a practice used by data input operators. When an actual date is unknown they substituted 99 99 99.)
September 23, 1999	99 days to Year 2000.
September 30, 1999 to October 1, 1999	This is the last fiscal rollover prior to Y2K for federal agencies including FHWA.
October 1, 1999	The first day of Fiscal Year 2000 for the US Government and the states of Alabama and Michigan.
December 31, 1999	The last day before 2-digit year equals 00. Many systems will not operate correctly as they transition to the next day. Also, sometimes used as "Never Expires" date (IBM tapes are marked 99365—all could expire this day).
January 0, 2000	To ensure this date is NOT processed. Some spreadsheets and database applications do have this problem and count January 0 as a day before the 1st.
January 1, 2000	**The key date in any compliance testing.**
January 1, 2000, 1200 Hr. (Noon)	Embedded date chip failure has been found.
January 3, 2000	The first full work day in the new year. First possible payday after rollover.
January 10, 2000	The first 7 or 8 character date in YYYY/M/DD format (2000/1/10 or 2000/01/10).
January 15, 2000	Internal Revenue Service W2 Forms due.
February 28, 2000	To ensure the leap year is being properly accounted for. Many programmers have incorrectly been taught that the year 2000 is not a leap year — Year 2000 IS a leap year. Systems should be tested to ensure correct handling of the transition to the 29 day of February 2000.

February 29, 2000	To ensure the leap year is being properly accounted for. Some systems may transition to the 29th of February 2000 correctly, but may not allow the date to be set to the 29th. This would happen if a system was reinitialized after the transition and should be explicitly tested for.
February 30, 2000	To ensure that this date is **NOT** processed (This has been found in some personal computer applications.)
February 31, 2000	To ensure that this date is **NOT** processed (This has been found in some personal computer applications.)
March 1, 2000	To ensure date calculations have taken leap year into account.
April 2, 2000	The first change to Daylight Savings Time after rollover (US).
April 15, 2000	Income Tax day.
September 30, 2000	This is the first fiscal rollover following Y2K for federal to October 1, 2000 agencies including FHWA.
October 10, 2000	This is the first 8 character date using a 2-digit month (2000/10/10).
October 29, 2000	The first return to Standard Time after rollover (US)
December 31, 2000	366th day of the year 2000. This could be a problem for systems that use Short Julian days.
January 1, 2001	The first day in the 21st Century. This is the last leap year related date, testing the first day of January 2001 to ensure it can be set.
February 29, 2001	To ensure that this date is **NOT** processed as a leap year.
September 9, 2001	A UNIX date when the "time_t" value goes from 9 to 10 digits. Bad data suspects are timestamps stored in fixed-column tables and internal variables.
After January 1, 2002	...or any other date past this day, to ensure no processing errors occur in backward calculations and processing of dates in the 1980s and 1990s at this point in time.

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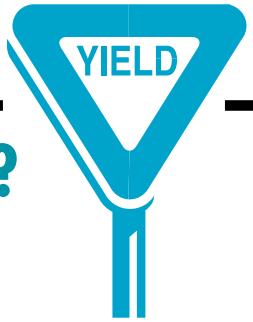
February 29, 2004	To ensure that this date is processed as a leap year .
January 1, 2037	The rollover date for the NTP systems.
January 19, 2038	Overflow of the UNIX systems.
September 18, 2042	Overflow of the IBM System/360.
2072, Exact Date TBD	Overflow of the Milstar Operating System.
February 28, 2100	To ensure Last Day of February is NOT a leap year.

The Dates to Watch

If your agency is currently doing or planning to do business with vendors from other countries there could be complications in receiving orders or conducting financial processes. Only a small number of countries have aggressively addressed Y2K. Here are few additional dates of interest that could help provide early indications of the magnitude of the Y2K problem at both the national and international level.

March 1999	The Securities Industry Association simulates December 29, 1999 trading.
April 1, 1999	The state of New York's fiscal year 2000 starts. It's also the start of the Canadian and Japanese fiscal years.
Apri l 6, 1999	The start of the United Kingdom Fiscal Year 1999-2000.
Fiscal Year 2000 for Business	Depending on the business, the fiscal year could start on March 1, 1999, July 1, 1999, or match the government fiscal year of October 1, 1999.
September 1, 1999	The Fiscal Year 2000 begins in the state of Texas.
January 4, 2000	The first business day of the Year 2000 in the United Kingdom.



WHERE DO ROUNDABOUTS WORK BEST?

2nd in a Series

Darlene Sharar, Technology Transfer Engineer
NWT2 Center

In this issue I'd like to provide some basic information on roundabouts, explain some of the uses for roundabouts, and discuss when their use is appropriate...or inappropriate. There are many situations where the selection of a roundabout is truly the best traffic control option. However, there are also instances where a roundabout may not be the best form of traffic control.

It is not the intent of this article to propose a quick and easy method for the selection of a roundabout, but rather to provide you guidance as to where a roundabout could be the most effective choice.

First, I'll describe the basic factors that should be taken into consideration when determining whether or not a location is a proper site for construction of a roundabout. Then, I'll describe the characteristics of those sites that may not be suited for use of a roundabout.

Once a roundabout is established as one of the traffic control options of a particular location, then the justification process begins …….

Benefits

Roundabouts have many advantages as a traffic control option, most of which center on the limitations of other intersection control alternatives. These alternatives include: traffic signals, two-way stop control (TWSC), and all-way stop control (AWSC).

Improved intersection operation, lower accident rates and severity, lower costs, and environmental factors are some of the advantages that a roundabout can provide when designed properly and placed correctly. Roundabouts have the ability to accommodate high volumes of left turn movements where other forms of traffic control have difficulty accommodating them. They can improve intersection safety by reducing the number of traffic conflicts at intersections. These can be reduced from 32 to just 8. Roundabouts can also reduce vehicle speeds and provide a clearer indication of the driver's right-of-way compared to other forms of intersection control.

Roundabouts, both in the USA and other countries, have achieved a **50 to 90 percent reduction** in collisions at intersections compared to using two-way stop control, four-way stop control, or traffic signals.

A roundabout also provides an opportunity to improve the aesthetics of an intersection with landscaping in connection with community enhancement projects .

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Characteristics of a Successful Roundabout

A modern roundabout in Port Orchard, WA

General Features

The following general features are necessary for a roundabout to perform safely and efficiently:

- Roundabouts must be easily identified in the road or street system.
- The layout of the roundabout must be clearly visible and marked appropriately.
- Adequate lighting must be provided at the roundabout for safe operation at night.
- The roundabout layout must also encourage drivers to enter the intersection slowly.
- Adequate sight distance must be provided at all entry points to enable the driver to enter the intersection and to observe the movements of pedestrians, bicyclists and other vehicles.

Types of Intersections

Internationally, roundabouts have been used satisfactorily as a traffic control option for decades. Roundabouts may be considered for a wide range of intersection types and sites. Possible sites include, but are not limited to:

- Intersections on Rural Roadways
- Intersections in Residential Areas
- Intersections on Urban and Collector Roadways
- Intersections on Arterial Roads and Streets in Urban Areas

Traffic Ratios

Although local agencies in Vermont have experienced roundabout success at intersections with the ratio of traffic between intersecting roadways as high as 9:1, many reference documents indicate that roundabouts perform better at intersections with roughly similar traffic flow ratios (e.g. 3:1).

When to Consider Using a Roundabout

Since a large number of factors need to be considered in evaluating a site and every situation is unique, it is not possible to specify whether a roundabout should or should not be installed based on a general situation description. However, the table below, may be used as a guide to review a proposed site on various functional roadway classifications.

Important. This table should NOT be used as the ONLY assessment for roundabout selection. Each proposed roundabout site should be reviewed for its own merits on a case-by-case basis. Each site should be evaluated for the "best fix" and should take into consideration the advantages and disadvantages of all alternative treatments, including a roundabout.

Roundabouts **may be** appropriate for the following situations:

- At intersections where traffic volumes on the intersecting roadways are such that:

1) "Stop" signs, "Yield" signs, or the "T" intersection-rule result in unacceptable delays for the minor roadway traffic.

   In these situations, roundabouts would decrease delays to the minor roadway traffic, but increase delays to the major roadway traffic.

2) Traffic signals result in greater delays than a roundabout.

   It should be noted that in many cases, roundabouts provide a similar capacity to signals, but may operate with lower delays and better safety, particularly in off-peak periods.

- At intersections where there are high proportions of left-turning traffic, especially those with single lane approaches.

  Unlike most other intersection options, roundabouts can operate efficiently with high volumes of left-turning vehicles.

- At intersections with more than four legs or unusual geometry.

  If some turns may not be prohibited, or more legs cannot be closed or relocated, roundabouts may provide a convenient and effective treatment option where:

  1) "Stop" or "Yield" signs do not define priorities adequately.

  2) Signals may be less efficient due to the large number of phases required, resulting in a high proportion of lost time.

- At intersections (including those in high speed areas) where a disproportionately high number of accidents occur which involve either crossing traffic or turning movements.

  In these situations, "Stop" or "Yield" signs may make little or no improvement to safety. Traffic signals may not be appropriate because of the low traffic volumes. Roundabouts have been shown to reduce the casualty accident rates significantly.

- At rural intersections, including those in high speed areas, at which there is an accident problem involving crossing or left turn (vs. opposing) traffic.

- At intersections of arterial roads in outer urban areas where traffic speeds are high and left turning traffic flows are high.

  A well designed roundabout could have an advantage over traffic signals in reducing left turn opposed type accidents and overall delays. Some crashes are associated with the "dilemma" zones created by signalization. There are no "dilemma zones" associated with a roundabout.

- At "T" intersections or intersections where the major traffic route turns through a left angle.

  This often occurs on rural facilities in small towns. In these situations, the major movements within the intersection are turning movements which are accommodated efficiently and safely at roundabouts.

- Where major roads or streets intersect at "Y" or "T" junctions, as these usually involve a high proportion of left turning traffic.
- At locations where traffic growth is expected to be high and where future traffic patterns are uncertain or changeable.

  Capacity at a roundabout may accommodate unanticipated growth and vehicle movements more readily than other traffic control options.

- At intersections of local roads or streets where it is desirable not to give right-of-way to either road or street.

- At intersections where "U" turns are desirable.

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The table listed below will also aid in the selection of a roundabout site:

ROUNDABOUT SELECTION CATEGORIES AND JUSTIFICATION CONDITIONS

	Category and Description	AWCS Warrant Met?	AWCS Los	Signal Warrant met?	Signal Los	Number of Lanes	Conditions For Justification
1	Community Enhancement	N/A	N/A	N/A	N/A	1	Typically applied in commercial & civic district - aesthetics are important.
2	Traffic Calming	NO	A	NO	A	1	Mainly residential application. Demonstrated need for traffic calming.
3	Safety Improvements	N/A	N/A	N/A	N/A	2	Existence of a safety problem which would be alleviated by a roundabout intersection treatment.
4	All-Way Stop Alternative	YES	B-D	NO	A-B	1-3	Delay should compare favorably with AWSC.
5	Low Volume Signal Alternative	YES	D-F	YES	A-C	1	Delay should compare favorably with signal.
6	Medium Volume Signal Alternative	YES	F	YES	B-D	1	Delay should compare favorably with signal. Other justifying factors required.
7	Special Conditions (such as unusual geometric, high volumes, right-of-way limitations, ets.)	Y/N	N/A	Y/N	N/A	N/A	Site specific justification required.

- Caution: Multi-lane roundabout installation selections should be evaluated very carefully and clearly justified. Although selection of multi-lane installations is not discouraged, for safety reasons caution in their use is strongly advised. Adequate time is needed for the traveling public to learn how they work and how to drive in them, either by experience in using a single lane roundabout installation or through an educational program.

POSSIBLE INAPPROPRIATE SITES FOR ROUNDABOUTS

Not all sites lend themselves to the use of a roundabout. Roundabouts may be inappropriate in the following situations:

- When a satisfactory geometric design cannot be provided due to insufficient space, unfavorable topography, or unacceptably high cost of construction; including the purchasing of right-of-way, costs for relocating utilities, etc.

- Where a signal interconnect system would provide a better level of service.

- Where it is desirable to be able to modify traffic flow via signal timings.

- Where traffic flows are unbalanced with high volumes on one or more approaches, and where some vehicles would experience long delays. (Although, this may be alleviated by metering with traffic signals up or downstream from the roundabout location.)

- Where a major road or street intersects with a minor road or street and a roundabout would result in unacceptable delay to the major roadway.

A roundabout causes delay and deflection to traffic on both roadways. Control by STOP or YIELD signs would result in delays to only the minor road or street traffic.

- Where there is considerable pedestrian activity and it would be difficult for pedestrians to cross either road or street due to high traffic volumes.

This would also include special-need pedestrian areas, such as areas with a large number of children or elderly. (This may be overcome by the provision of pedestrian crossing facilities on each leg of the roundabout.)

- Where a roundabout would be close enough to existing signals, railroad tracks, and drawbridges, that queuing from the signals would interfere with the roundabout.

- At an isolated intersection in a network of linked traffic signals.

In this situation a signalized intersection linked to the others would generally provide a better level of service.

- Where peak period reversible lanes may be employed.

- Where large combination vehicles or over-dimensional vehicles frequently use the intersection and insufficient space is available to provide for the required geometric layout. (The reported percentage of truck traffic that roundabouts may handle is in the area of 30%.)

- Where traffic flows leaving the roundabout would be interrupted by a downstream traffic control device which could result in queuing back into the roundabout.

An example of this is a nearby signalized pedestrian crossing. The use of roundabouts at these sites need not be completely discounted, but they are generally found to be less effective than adopting a signalized intersection treatment.

- Areas with a large number of cyclists.

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Roundabout Conference in the Planning

Darlene Sharar, Technology Transfer Engineer
NWT2 Center

Interest in roundabouts has grown so much that the NWT2 Center has decided to host a roundabout conference. This will be your opportunity to learn from the experts and find out from those with hands-on experience how roundabouts work.

The conference location is tentatively planned for the Seattle-Tacoma area with a target date in November 1999. When the facilities and dates are finalized, they will be posted on our website and published in the T2 Bulletin.

With the addition of the conference, the summer training classes on roundabouts have been trimmed back to two. Both classes will be held in June, one in Olympia and one in Wenatchee. The classes will cover the basics of roundabouts and introduce the Washington Local Agency Roundabout Guide. The two sessions will be open, allowing class discussion to lead the direction of the classes. The Olympia class will be held June 2, 1999 and the Wenatchee session will be held June 17, 1999.

For conference, class and/or guide information, please contact Darlene Sharar at either or **sharard@wsdot.wa.gov** or (360)705-7383.

ROUNDABOUT NEWS FLASH

Darlene Sharar, Technology Transfer Engineer
NWT2 Center

Updates and changes regarding roundabouts from your LTAP center!

The Local Agency Roundabout Guide is in the final stages of development as you read this article. Printing is now scheduled for March with distribution targeted for April.

Here is a draft copy of the Table of Contents to let you know what topics will be covered:

SECTION 1: INTRODUCTION

1.1 ROUNDABOUT CHARACTERISTICS
1.2 USE OF ROUNDABOUTS
1.3 APPROPRIATE SITES FOR ROUNDABOUTS
1.4 INAPPROPRIATE SITES FOR ROUNDABOUTS
1.5 MODERN ROUNDABOUT VS OLDER TRAFFIC CIRCLE

SECTION 2: ROUNDABOUT JUSTIFICATION

2.1 INTERSECTION CONTROL ALTERNATIVES
2.2 NEGATIVE FACTORS
2.3 ROUNDABOUT JUSTIFICATION CATEGORIES
2.4 COMMON DATA REQUIREMENTS
2.5 ROUNDABOUT JUSTIFICATION PROCEDURE

SECTION 3: ROUNDABOUT PERFORMANCE ANALYSIS

3.1 INTRODUCTION
3.2 THEORY OF ROUNDABOUT OPERATION
3.3 ROUNDABOUT MODELING BY SIDRA
3.4 COMPARISON OF RESULTS
3.5 OTHER ANALYSIS MODELS
3.6 FIELD EVALUATION OF ROUNDABOUT PERFORMANCE
3.7 CLOSURE

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SECTION 4: GEOMETRIC DESIGN OF ROUNDABOUTS

4.1 DESIGN VEHICLE
4.2 DESIGN SPEED
4.3 APPROACH AND ENTRY CHARACTERISTICS
4.4 CENTRAL ISLAND
4.5 TRUCK APRON
4.6 CIRCULATING WIDTH
4.7 INSCRIBED CIRCLE DIAMETER
4.8 EXIT CURVES
4.9 SPLITTER ISLANDS
4.10 DEFLECTION
4.11 FLARE
4.12 SIGHT DISTANCE REQUIREMENTS
4.13 SUPERELEVATION AND DRAINAGE
4.14 STREETS OF UNEQUAL WIDTH AND/OR WIDE MEDIANS
4.15 ROUNDABOUTS AT "T" INTERSECTIONS
4.16 PARKING
4.17 BICYCLE AND PEDESTRIAN DESIGN CONSIDERATIONS
4.18 SPECIAL CONSIDERATIONS
4.19 ROUNDABOUTS ON LOCAL ROADS
4.20 A TYPICAL ROUNDABOUT EXAMPLE

SECTION 5: OPERATIONAL CONSIDERATIONS

5.1 SIGNING
5.2 PAVEMENT MARKINGS
5.3 LIGHTING
5.4 LANDSCAPING

SECTION 6: CONSTRUCTION

SECTION 7: EDUCATION - PUBLIC AND LOCAL AGENCY

As you can see, Sections 6 & 7 still need some expansion, but they will be there at printing time!

The classes are scheduled this spring and will cover the basics of roundabouts and introduce the Guide in detail. Two classes are planned for June, one in Olympia and one in Wenatchee. The Olympia class will be held June 2, 1999 and the Wenatchee session will be held June 17, 1999. For more information contact me at **sharard@wsdot.wa.gov** or (360)705-7383.

A T2 PROFILE

Safety Management Systems "New Kid"

Greetings … I would like to take advantage of the T2 Center Bulletin and introduce myself to each of you … I am the "New Kid on The Block … or, should I say in T2?" I am Darlene Sharar, I have been with WSDOT for over 17 years now - boy does that sound scary!

My main duty will be to assist all of you with developing your own "Safety Management Systems" and facilitate the transfer of the latest and greatest in new traffic information. If you have something that works for you - please let me know so I may pass it on to others. I am looking forward to meeting with you and helping out wherever your traffic needs are!

I have been in Traffic at WSDOT for 11 of the above 17 years. My traffic related experiences include around six years of sign, illumination and signal design. For two years I administered the District 3's "Outdoor Advertising Control (OAC)" and "Motorist Information Signing (MIS)" programs. If assistance with the "Scenic Vistas Act" and what it has to offer interests you - I can help! The past three years in traffic has kept me busy with traffic related training (Laurel Grey of the NWT2 Center and I worked together in this area before I came to T2.) I have also been involved in roundabout research and development of the roundabout design guide specifications for WSDOT.

Six years were spent on survey crews (although it was so long ago that we used transits and levels), in scale shacks, on paving operations, in testing trailers, in concrete and asphalt plants, performing records control for contract payment and tracking, roadway design, and finally (I believe) in the materials laboratory working up the "Record of Materials (ROM)" for state and local contracts as well as processing the "Request for Approval of Material Sources (RAMS)."

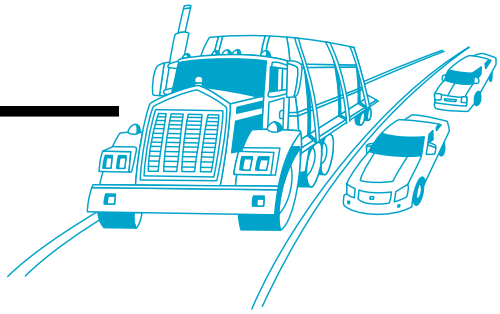
So if you are in need of specific traffic training, between the two of us, we can set up a class.

I am willing to help when you let me know there is a need. If I do not know the answer myself, I will either find it or get you the correct person. I am available on the Internet at: sharard@wsdot.wa.gov. My phone number is (360)705-7383.

Thank you. Hope to meet you soon!

Darlene Sharar
Technology Transfer Engineer
WSDOT-NWT2 Center

TRAFFIC CALMING



By:Darlene Sharar, Technology Transfer Engineer
NWT2 Center

Many communities in our state are attempting to modify aggressive driving behavior: behavior that includes exceeding speed limits near schools, residential areas, and on local roadways. When vehicles exceed the posted speed limits in these areas, extremely dangerous conditions result.

How can local agencies and citizens protect their families from this increasingly aggressive driver behavior? Traffic calming is fast becoming the "hottest term" in the United States when aggressive and other unwanted driving issues arise in a community. Traffic calming is a method communities may use to slow down aggressive drivers, reduce commute traffic taking short-cuts through residential areas, reduce noise, and bring tranquillity back into their neighborhoods and onto their roadways.

Some of the physical features utilized to "calm traffic" are road bumps, road humps, traffic circles, roundabouts, and chicanes, among others. Each of these specific devices either slows traffic down, or discourages unwanted traffic.

The City of Portland has a successful traffic calming program that has existed for several years. When an area for traffic calming is being reviewed, the community is not the only group involved. Emergency services, transit, school districts and other affected services are notified of the possibility of traffic calming along their route. Each group's input is encouraged during the entire selection and review process for installation of a traffic calming measure. This ensures all users of the facility are aware of the proposed installation and have an opportunity to voice their needs and concerns - pro and con. This process also encourages community involvement from citizens and services within the affected neighborhood.

Here are a few "Traffic Calming" sites on the Internet:

http://www.ci.ventura.ca.us/

From here select the "Traffic" section in the far right column. Once inside the "Traffic" section, select the "Traffic Calming Program." This site has 26 pages of in-depth information on "Traffic Calming" techniques.

http://www.ci.danville.ca.us/figures.htm

This site shows in figures the "Traffic Management Tools" used in a traffic calming program.

http://www.trans.ci.portland.or.us/Traffic_Management/trafficcalming/

This is the City of Portland's traffic calming site. It is an in-depth site providing a wealth of data on traffic calming.

http://www.ci.seattle.wa.us/td/nts/trafcirc.htm

This is the City of Seattle's traffic calming site. It will show you what they have done and how they did it!

Good luck and happy calming …….. Darlene

BIOLOGICAL ASSESMENT; DOING IT RIGHT

Brian Hasselbach, Environmental Engineer,
WSDOT-TransAid Service Center

With the upcoming spring salmon listings to the Endangered Species Act (ESA), the potential certainly exists for the ESA to significantly impact a portion of, if not all, local and state transportation projects and activities. It is vital, therefore, that we initiate the planning process now to ensure that our transportation projects and activities continue to move forward in an environmentally responsible fashion."

One of the major impacts on local agencies is the need to evaluate the impacts a project might have on any ESA listed species within a 1.5 mile radius of a project site. To fulfill this requirement, a local agency needs to conduct a biological assessment.

...need to evaluate the impacts a project might have on any ESA listed species within a 1.5 mile radius of a project site.

The biological assessment is a tool used to document a project's impacts and state an "effect determination" of the impacts on any ESA listed species. The biological assessment process reaches completion once the local agency obtains concurrence with its "effect determination" from either the U.S. Fish and Wildlife Service and/or the National Marine Fisheries Service.

With the widespread impacts the spring salmon listings will have across the state, the need to conduct biological assessments will become an increasingly important component of a number of our transportation projects and activities. Recognizing that a number of local agencies do not have the staff or the biological knowledge to conduct biological assessments, TransAid has been working on a number of solutions to better assist the WSDOT Regions and the local agencies in ensuring compliance with the ESA's requirements.

In cooperation with WSDOT's Environmental Affairs Office, TransAid has developed a series of workshops to introduced participants to the Endangered Species Act and its requirements, specifically the need to conduct biological assessments. The first workshops were held in November and December and were well received by those who participated.

The workshops are designed for a broad audience. It is important for everyone involved in a transportation project or activity to understand the requirements stemming from the ESA. With this in mind, the first portion of the workshops provide participants with an introduction to the ESA, its requirements, and its implications to local agency transportation projects and activities.

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The second portion of the workshops provide a detailed look at how an individual completes a biological assessment. The sessions inform the participants who to contact to initiate the process, key components to include in the document, how to make an effect determination, and the required interaction between the local agency and the federal resource agencies.

...the need to conduct biological assessments will become an increasingly important component of a number of our transportation projects and activities.

A major focus of these workshops is to educate participants on how to write the assessment in the appropriate language and with sufficient detail to avoid delays and expedite concurrence from the federal resource agencies. The ESA allows federal agencies a thirty day review period to either concur with an "effect determination" or disagree and return the biological assessment to the local agency for revision. If the federal agency returns a biological assessment to a local agency to re-write and re-submit, the federal agencies have a new thirty day period to review the changes. It becomes quickly apparent how lengthy this process has the potential to become. One of the goals of these workshops, therefore, is to help educate participants on what they can do to "polish" their biological assessment to the greatest extent possible prior to initial submittal to the federal level.

TransAid recognizes that a number of agencies were not able to send representatives to the winter workshops or heard about them too late to register. So, TransAid plans to continue conducting them. At this point, we simply need to schedule classes as the participation interest at the local agency level develops. TransAid has begun to develop a list of interested participants. When enough participants are interested to form a class, we will set up a new class, establish the location and date, and send out advertisements and registration forms.

If you are interested in attending a workshop of this nature, please contact Brian Hasselbach at e-mail hasselb@wsdot.wa.gov or (360) 705-6975.

SHRP New Website Launched

A website has been developed which provides up-to-date information on efforts to implement new technologies and operations under the national Strategic Highway Research Program (SHRP).

SHRP was a five-year, $150 million project under which more than 100 innovative technologies for roadway construction, maintenance and operations were developed and evaluated. Upon the conclusion of SHRP in 1996, the Lead States Program was launched by the AASHTO Task Force on SHRP Implementation to assist state transportation agencies in sharing practical, real-world experiences with others.

A web site was recently created to provide information on the following seven high-payoff technologies:

1. Superpave System
2. High-Performance Concrete
3. Anti-icing/Road Weather Information Systems
4. Innovative Pavement Maintenance Materials Pavement Preservation
5. Concrete Assessment and Rehabilitation
6. Alkali-Silica Reactivity

The web site contains information about field trials, research projects, events, training opportunities, publications, and other resources, as well as names and contact information for members of the Lead State teams. On-line question-and-answer discussions about technologies are also available.

You can find this site at http://leadstates.tamu.edu

LOCAL TECHNOLOGY ASSISTANCE PROGRAM (LTAP) WANTS:

YOUR IDEAS, ARTICLES AND QUESTIONS!!!

We want the T2 Bulletin to be more than a clearinghouse of outside information that we gather … we also want to share YOUR ideas and successes with the other agencies in Washington so they can reap the benefits of your success. We want to know what is working for you, what ways you are applying new technology, and any handy tips you've come up with. Information sharing benefits everyone.

This is YOUR T2 BULLETIN!!! Consider using this bulletin as your broadcasting station for proven ideas that have saved you money, saved you time, improved your efficiency, or made your system safer. If you have a new, quick way to perform a job - consider writing the steps down and sharing them with over 2300 (and growing) others that read THIS newsletter!

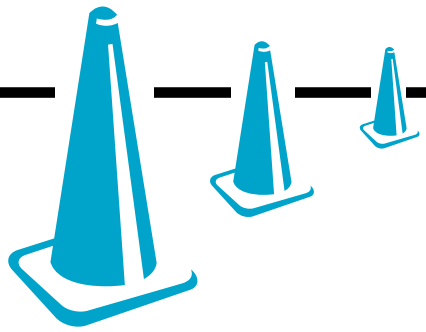
If you have a question or would like to see certain topics included in the T2 Bulletin let us know. We'll do our best to research them and pass on to you and the other readers our findings. If you have a question, more than likely, others do too.

Go ahead and drop us a line or call any one of us at:

Dan Sunde	Director	SundeD@wsdot.wa.gov	(360) 705-7390
Paul Sachs	T2 Engineer	SachsP@wsdot.wa.gov	(360) 705-7352
Darlene Sharar	T2 Engineer	ShararD@wsdot.wa.gov	(360) 705-7383
Roger Chappell	Hi tech stuff	ChappeR@wsdot.wa.gov	(360) 705-7539
Laurel Gray	Training	GrayL@wsdot.wa.gov	(360) 705-7386

Passing on information that is useful to you is our quest and the T2 Bulletin is a great method of transmittal!

WORK ZONE SAFETY - IT CAN MEAN YOUR LIFE!!!



Darlene Sharar, Technology Transfer Engineer
NWT2 Center

You are working on a construction project. You have closed a lane to traffic. You think that your work zone set-up is fine …. then a driver hits your arrow panel ……

Now, consider the average driver... if one exists. Is the driver on "auto pilot"? Is the baby crying in the car seat? Is the driver sleepy? Are the kids fighting in the back seat? Did the driver just have a quarrel and is angry or teary eyed? Is the driver under the influence of an over-the-counter medication, prescribed medication, illegal substance, and/or alcohol?

Have you ever been driving down the road, and realized you are "all of a sudden" driving through a construction area? You know that you should have seen those huge orange and black signs before the construction site ….. where were they? You have been driving "on auto pilot" with your mind off on other things ….. or maybe you felt you had reason to not believe the orange and black signs even if you did see them! How many times has the driver seen orange and black construction signs with no construction activity in sight? How many times has the driver come across a closed lane with no lane closure signing? How many flagging signs has the driver seen with no flagger present?

Now, take any one or a combination of the above factors and introduce a work zone into the driving task. It should be apparent that there are many reasons working near the traveling public can be dangerous place. Your life is at stake each time you work in or along the roadway. In order to help both you and the driver, work zones MUST convey clear and consistent meanings to the traveling public.

How is this task accomplished? Several factors contribute to good traffic control - Here are a few:

- Employees dealing with construction work zones must be trained on the design, implementation, modification and removal of work zones.

-For an on-line Work Zone safety and Flagging training tutorial, please refer to New York State's T2 Center's site: http://www.cals.cornell.edu/dept/aben/localroads/intro.htm - this is a wealth of information!

- Employees need to be familiar with the Manual on Uniform Traffic Control Devices (MUTCD); Part VI - Standards and Guides for Traffic Control for Street and Highway Construction, Maintenance, Utility, and Incident Management Operations.

- To purchase copies of the MUTCD, Part VI, contact American Traffic Safety Services Association (ATSSA) at: www.atssa.com for order forms.

- Employees engaged in flagging operations MUST be fully trained and certified, both for the safety of the driver and the flagger.

- Flaggers are required to keep their flagging cards current and carry their cards with them when conducting flagging operations. Flagger certification may be obtained at many community colleges. If training is not available in your area, you may contact "Evergreen Safety Council" at: http://www.esc.org/ for additional flagging information.

- Work Zone Traffic Control Devices must be in new or acceptable condition.

- In order for work zone devices to command attention and respect, they need to be of a quality that the traveling public will take serious. ATSSA distributes a "Quality Standards" pamphlet for Work Zone Traffic Control Devices. ATSSA's web site address is: www.atssa.com to purchase pamphlets.

- Work Zone Traffic Control Devices must accurately reflect the work zone situation and be used consistently.

- In order for the Work Zone Control Devices to be credible to the driver it is important to install them in a consistent manner and they should accurately reflect work in progress. When the work is complete or inactive for an extended period of time the devices should be removed as soon as practical.

A new Internet web site to obtain work zone information is the "National Work Zone Safety Information Clearinghouse". They are located at: **http://wzsafety.tamu.edu.** They also publish a newsletter which you may request using E-mail at: workzone@tamu.edu. Give them a look!

Any person that has worked in the roadway knows that it takes just a split second to lose your life ….. you seldom get a second chance when metal connects with flesh. A good work zone can mean that you and the driver can go home each night ...

Take care …. be safe ….

It's Quick! It's Easy! It's FREE!

Are you tired of not being able to locate your copy because your co-worker has "borrowed" it ...or it never got to you in the first place because it's sitting in someone else's inbox...And, when you do get it the information is either out of date or too close to work into your schedule? Have we got a deal for you!

The T2 Center announces the availability of our four new list serve sites!

Simply subscribe to the List Servers of your choice via the e-mail addresses listed below. Then the item that once came to you in hard copy via snail mail (at the expense of a poor tree) is now zapped instantly, directly to you on your computer. Wow! No paper! No postage! No delay! No hassle!...And items like the newsletters come in living color! What more could you ask?

Want to subscribe?

Its easy! Simply open your Internet browser type in http://lists.wsdot.wa.gov

Under the words post.office you will find a button marked "Mailing List Directory."

When you Click on this button it will take you to a page with letters across the top.

Choose the letter corresponding to the first letter in the address, of the list that you want to subscribe to. Now Click on the address of the list you want to subscribe to. You should now see a description of the site, and at the bottom of the page a box for sending your Email address and three button choices.

- Immediate Delivery: This will deliver any posting to you as soon as they become available.
- Digest Delivery: This format will bundle all postings and send them once a day.
- Unsubscribe : This removes you from the mailing list

Once you submit your subscription, you will be sent a validation letter to confirm your choices. The last step is to return and Email acknowledging the comfirmation.

Here they are!

T2 Training Opportunities
t2trng-L(Lists).@wsdot.wa.gov

If you would like to receive the T2 Training Opportunities, the Audio Visual Catalog, Class Announcements, and other training resources subscribe here.

These training resources include training course announcements with on-line registration forms, technical conference schedules, and other training resource materials.

T2 Bulletin
t2news-L@(Lists).wsdot.wa.gov

If you would like an electronic version of the T2 Bulletin in full and any technical material distributed by T2 this is the place.

The TransAid T2 Bulletin will arrive quarterly in a "PDF" format that can then be viewed or printed. As you know this periodical is dedicated to covering a wide range of technical topics to assist Washington State communities and local governmental agencies in managing, constructing and maintaining their transportation infrastructure.

Each issue is packed with a variety of information and resources, from the latest in pavement de-icing technology, construction of roundabouts, work zone safety and pavement management, to computer issues such as the Year 2000 computer problem, use of Global Positioning (GPS), Geographic Information Systems (GIS), and the Web. There are also a host of training opportunities, free publications and common sense technical solutions.

As we count down to the year 2000, we will use this list server to bring local agencies important Y2K information that may have an affect on the way you do business.

T2's Web Technology Interest Group (WTIG)
WTIG-L@(Lists).wsdot.wa.gov

The Web Technologies Interest Group (WTIG) is an inter-agency and inter-departmental users group whose members share a common interest in Web development and application technologies. This group is currently hosted by WSDOT, TransAid Technology Center. We normally meet every other month. We have presentations on a variety of Web related topics, such as Cold Fusion (CFML), Internet map serving, list severing, Java script, HTML, active server pages and others. From this list sever subscription you will receive meeting notifications, meeting minutes, and Web informational updates.

T2's Pavement Technology
t2pave-L@(Lists).wsdot.wa.gov

Here you will receive periodic technical information on pavement technology and local agency pavement management information including regional chapter meetings of the Northwest Pavement Management Association (NWPMA), the NWPMA Newsletter , and any late breaking technical information.

Roger's Info Surf On Hot Websites

Roger Chappell, Technology Integration Specialist
WSDOT-NWT2 Center

The monitor is hot, there is a cool breeze coming off the hard drive, you can almost feel the cyber sand between your toes, and taste salt in the air. It's time to hang ten and catch the wave of information breaking upon the shores of your desktop.

The first wave we will catch will be a few valuable resource sites for Local Agencies. So, type the URL (uniform resource locator), starting with "http://", into your Internet browser, and hang on for the ride. Some sites may be familiar to the ardent resource surfer, but there should be something here for everyone, even if it is your first wave.

TransAid's site

http://www.wsdot.wa.gov/TA/HomePage/TAHP.htm

Of course, I have to start with the shameless self promotion, not just because I think we have a really hot site, but because I think there are a lot good resources available for local agencies. In addition to our T2 Center page, where you can access many training opportunities and on-line publication resources, you will find web pages covering a wide verity of subjects such as: Management Systems (pavement management, safety management, information systems and more),Grant programs, TEA-21, STIP, Bridge information and LAG (Local Agency Guidelines.)

This site is part of WSDOT (Washington State Dept. of Transportation) at: **http://www.wsdot.wa.gov**

County Road Administration Board (CRAB)

http://www.crab.wa.gov/

Even if you represent a small city, they have many helpful articles and links to resources that can help your agency.

Munisource

http://www.munisource.org/

This is a "notice board" called the "Municipal Forum" where those involved in municipal government can post notices or queries and check back later to view responses. Use it for whatever you want; job postings, tenders, items for sale, bylaw inquiries, conference notices or just leave messages for friend. They also have a chat room, called the "Municipal Grapevine", available for those who want to conference with others, and perhaps avoid those long distance charges!

They also have a lot of Y2K resources available.

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Municipal Research & Services Center (MRSC)

http://www.mrsc.org/

Programs and services are available to Washington's 275 cities and 39 counties. MRSC's resources include a professional staff who are local government experts, a comprehensive local government reference library, publications, and an information packed site on the World Wide Web.

One of their principal services is to respond to inquiries on virtually every facet of local government. Staff experience includes budgeting and finance, municipal law, public management and administration, planning and growth management, public works and utilities, and local government policies.

MRSC's library contains the state's largest collection of local government reference materials, with over 12,000 volumes. Available materials include local ordinances, city and county codes, budgets and financial reports, comprehensive plans and documents illustrating virtually every function and operation of local government. City and county officials are encouraged to send copies of local documents so that they can be shared with other local governments.

You can also access the **AWC** (Association of Washington Cities) at this site location **http://www.mrsc.org/AWCFILES/awc.htm**

Washington State Association of Counties (WSAC)

http://www.wacounties.org

WSAC is a non-profit, non-partisan organization that represents Washington's counties before the state legislature, the state executive branch, and regulatory agencies. WSAC focuses its work in several areas:

- Legislative Advocacy
- Membership Assistance
- District & Statewide Conferences
- Technical Assistance / Educational Workshops
- State Agency & Rule Making Advocacy
- Publications

APWA American Public Works Association (APWA)

http://www.pubworks.org/

They are the engineers, technicians, public works directors, business people, contractors, and many others involved in bringing you public projects and services to make communities run efficiently. They have Y2K information, educational materials, and resources geared to meet the needs of public works departments.

ACCIS

http://www.mrsc.org/accis/index.htm

ACCIS is an organization in the state of Washington, composed of the chief information system officers from the cities and counties throughout the state. The goals of ACCIS are:

- To promote a communication link between the Information Systems functions of the counties/cities.
- To represent county/city Information Systems interests to state officials, and to call attention to legislation affecting data processing operations.
- To provide education for county/city officers on roles, responsibilities, and requirements of Information System departments.

The U.S. State and local gateway

http://www.statelocal.gov/

This web site was developed to give state and local government officials and employees easy access to federal information. They have some resources for disaster management for local agencies, Y2K information and other training opportunities.

Infomine by the University of California

http://lib-www.ucr.edu/govpub

There are many good resources available here, I did a search on GIS (Geographic Information Systems), since that is an area of interest for me. Just one of the many resources that I found helpful was the "GIS Dictionary". The GIS Dictionary defines almost 1000 terms which either relate directly to GIS or which GIS users may come across in the course of their work. You may select a definition by term, from an alphabetic list, or by category. The dictionary can be found at:

http://www.geo.ed.ac.uk/agidict/welcome.html

U.S. Department of Transportation

http://www.dot.gov/

They have many links to transportation related topics. One thing that I found helpful dealing with Y2K issues is located at **http://www.y2ktransport.dot.gov/** .

This site serves as a clearinghouse for Year 2000 information sharing among the transportation community, both foreign and domestic, to disseminate governmentwide Year 2000 policies and to provide links to other useful Year 2000 sites.

International City/County Management Association (ICMA)

http://www.icma.org

ICMA is a professional and educational association for administrators and assistant administrators serving cities, counties, other local governments, and regional entities. ICMA's mission is to strengthen the quality of local government through professional management.

C.R.O.W.

http://govt.net/

This site has many links to a wide variety of government services. Try their "Govtlist" and "Govtlinks". They also have a magazine called Public Innovation Abroad. It is published by the International Center of the Academy for State and Local Government to promote the international exchange of practical experience in dealing with common problems at the state, county and city levels of government. They also maintain a link to every web page maintained by every city or county in America at: **http://govt.net/govtlist/index.htm**

Access Washington

http://www.wa.gov/

This is the state Internet portal providing interactive government services on-line to help meet the needs of the citizens of Washington. Access Washington is developed and managed by the Washington State Department of Information Services (DIS).

One of the resources that I have found helpful is:

"Find-it" http://find-it.state.wa.us/compass, a Project of Washington State's Government Information Locator Service. Some of the site's features are:

- On-line Document Index: Search or browse their collection of on-line documents and web pages.
- Frequently Asked Questions/Queries: Browse their lists of the most frequently requested information
- Publication Index: Search their collection of government publications available at public libraries and state libraries.

Portions of this site are maintained by the Washington State Library:

http://www.statelib.wa.gov

EFFECT OF ROAD SHOULDER TREATMENTS ON HIGHWAY RUNOFF QUALITY AND QUANTITY

M. S. St. John & R. R. Horner
1997 WSDOT Research Report, WA-RD 429.1;
Source: TRIS abstract

This project examined the role that road shoulders play in the stormwater runoff process.

The goal of the research was to determine the type of shoulder treatment that yields the least quantity of runoff of the highest quality. Three types of shoulder materials were tested: conventional asphalt, gravel, and porous asphalt. Porous asphalt allows water to penetrate and flow through the pavement to a sublayer, and it can be used in place of conventional asphalt on low-traffic roadways.

Each of the three shoulder materials were tested in duplicate on a heavily traveled, two-lane road north of Redmond, Washington. Stormwater runoff from the road flowed onto the shoulder test sections and was collected in a stormwater collection system at the base of the test sections. Flow-weighted composite samples were collected, and both runoff quantity and quality were evaluated.

On the basis of results from 11 storms monitored between November 1995 and August 1996, several trends were identified:

- The porous asphalt shoulders demonstrated a greater potential to reduce runoff volumes and peak discharge rates than gravel and conventional asphalt shoulders. During typical wet season storms [0.76 cm (0.3 in.)], the porous asphalt and gravel shoulder test sections reduced runoff volumes by approximately 85% and 30%, respectively, in comparison to the conventional asphalt test sections. The ability of the porous asphalt shoulders to reduce pollutant loads far exceeded that of the gravel and conventional asphalt shoulders. During typical wet season storms the solids and pollutant loads from the porous asphalt shoulders were more than 90% lower than the loads from the conventional asphalt shoulders. The gravel shoulders yielded load reductions ranging from 10% to 70% lower than the conventional asphalt, although ortho-phosphorus loads exceeded those of the conventional asphalt shoulder by nearly 30%.

- Removal rates were highest for those pollutants that were correlated with total suspended solids (0.70<r-squared<0.95), indicating that the physical mechanisms of settling and filtration were critical in removing pollutants from the runoff over both porous asphalt and gravel shoulders.

- The porous asphalt shoulders were more efficient at removing soluble pollutants, particularly ortho-phosphorus, than the conventional asphalt and gravel shoulders.

- After one year of use the porous asphalt shoulders showed no signs of clogging, maintaining infiltration rates of 4445 cm/hr (1750 in./hr).

GEOTECHNICAL DRILLING CUTTING EDGE TECHNOLOGY

By Rich Barrows and Stephen Hay 1998
Source: http://www.wfl.fha.dot.gov/td/

The Geotechnical Business-Focused Team of the Western Federal Lands Highway Division (WFLHD), required a process for collecting data during geotechnical subsurface explorations that was easier and faster than the handwritten bore-hole logging (recording) system currently being used by WFLHD.

The team set out to develop a system that would increase the efficiency of bore hole logging, eliminate soil and rock classification errors and provide a method for rapid data transport from the field to the WFLHD office. The focus was primarily on phasing out handwritten bore hole logging and implementing a procedure for electronic bore hole logging.

Most of the roadway projects that WFLHD designs and constructs requires a drill program for characterizing the subsurface conditions of proposed projects. Typically projects are located in remote, rugged terrain with extreme variability in weather conditions. Depending on the scope of the project, several exploratory bore holes are made with a drill rig. Drilling is comprised of a series of core or auger runs which are generally 1.52 meters (5 feet) in length. Each run retrieves core samples or drill cuttings which is visually inspected and compiled into boring logs based on a system of soil and rock classifications and interpretation. In addition to core and auger runs standard penetration testing are often performed. These samples are classified using the unified soil classification system.

Before November 1995, each soil and rock classification was manually drafted by a drill inspector, edited by the project geotechnical engineer, and typed by a technician before placement in a final geotechnical report. Needless to say, these final logs took several days to a few weeks to complete because staff time was constrained during the editing and redrafting phase of this project. In addition, the boring logs were subject to human error and to inconsistencies in soil and rock classification from one drill inspector to the next.

The Geotechnical BFT worked with the WFLHD Technology Development Team to obtain funding to develop an automated bore hole logging system. The goals were to eliminate the costs for producing, tracking, and reentering information currently collected on paper forms; to improve quality control; and to develop a system that was user-friendly, rugged, weatherproof, and field-portable. Desired characteristics included pop-up soil and rock classification menus, accurate calculations, the capability to log in English and metric units, rapid off-loading of electronic forms, less effort, and increased quality.

During 1995 and 1996, WFLHD began evaluating a hand-held personal digital assistant (PDA). This PDA allowed the user to enter information using a hard tipped, plastic pen capable of writing directly on the screen. This unit transferred written letters to type and automatically saved the information. Data could also be entered by typing on a built-in, pop-up, soft keyboard that places typed text on the screen.

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In 1996, WFLHD awarded a contract to GAIA Software Inc. in Portland, Oregon to develop a software package based on a geotechnical format specified by WFLHD.

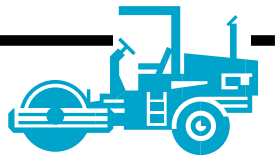
Testing continued in late 1996 and early 1997 and weather-proofing and overall protection of the device was addressed. The Drillers were most concerned about this phase because they do not stop drilling in bad weather and did not want to have to build special enclosures to protect the borehole logging computer equipment. The Geotechnical BFT purchased ruggedized PDA that was designed to be extremely durable and best of all, waterproof. During testing, WFLHD drill personnel promptly discovered a design flaw with the ruggedized PDA's water proof case when it filled with water. Needless to say, the PDA stopped working, The manufacturer revised the production process and provided the team with a new unit. The drill personnel took up where they left off and began drop testing the ruggedized PDA. It survived!

Field testing was done with the standard and ruggedized PDA units at the Prince of Wales Island, Alaska; Glacier National Park, Montana; and Spokane Indian Reservation, Washington. These locations proved to be ideal for testing because they collectively provided a variety of weather and drilling conditions. Once mastered, the handwriting recognition features of the PDA's was swift and reliable, and the need for paper boring logs diminished. By the time testing was completed, several software modifications and hardware reconfigurations were implemented, and the system evolved into a form suitable for standard production.

The ruggedized PDA proved itself by standing up to the strange wet El Nino induced snows of 1998 without missing a beat.

The automated system is more efficient and eliminates classification inconsistencies encountered with manual logging. This system allows the storage of large quantities of borehole data. The manual method required the drill inspector to keep sheets of boring logs organized, and data was transferred by facsimile or mail to the WFLHD offices. With the automated system the user can transfer information to back-up storage cards. In addition the electronic boring logs can be transferred to the WFLHD office via Internet e-mail. It is a remarkable feat that with the touch of a plastic pen, the PDA begins dialing and sends data over the Internet with all the authority of a full-size Pentium personal computer. During data transfer, logs are directly imported into the WFLHD computer system and processed into a final bore log format. What previously took days or weeks can now be done in a matter of minutes. As the automated method of bore hole logging becomes more widespread, we can expect additional software and hardware refinements.

"Pavement Quality and Customer Service"



Top the Agenda at Hot Mix Asphalt Conference

by Margaret Blain Cervarich, NAPA

Source:

"There's so much change going on in the hot mix asphalt industry, it's an era that is going to go down in the history books," said National Asphalt Pavement Association (NAPA) President Mike Acott in opening remarks at the Sixth Annual United States Hot Mix Asphalt Conference Nov. 4-6 in Portland, Oregon. More than 500 asphalt contractors from throughout the United States and overseas attended the three-day event.

A major focus of the conference was to discuss techniques contractors and highway agencies can use to better communicate with the public in response to environmental and traffic congestion concerns. The conference speakers also provided a wealth of technical information on how the asphalt industry can deliver improved pavement quality and performance, in order to reduce traffic interruptions for road construction and repairs.

The Key Issues

"In addition to a significant improvement in quality and performance of Hot Mix Asphalt, the key issues for NAPA are environmental — safety and health, climate change, clean air, occupational safety and health, disposal of wastes and solvents, recycling, congestion mitigation, noise, mass transit, and wetland protection. There are a lot of groups out there that seek to reduce the consumption of fossil fuels, and try to prevent the construction of new highways and the use of the automobile. Plus we have a lot of community involvement now regarding road construction and the siting of hot mix asphalt plants," Acott said.

"The other issue is traffic," Acott continued, citing the pavement-damaging effects of increases in truck volumes, loads, and tire pressures, the trend toward reduced inventories and on-time deliveries, the need to reduce the costs of traffic delays in order to compete in the global marketplace, and the public's concern with increased congestion and work zone delays, which has sparked a trend toward night construction.

Customer Service

Keynote speaker Grace Crunican, Director of the Oregon Department of Transportation, said her agency has developed an action plan for providing better customer service. Agency accountability is a key feature of the plan, she said, mentioning as an example the corrective action needed to prevent a striping job from continuing into morning rush hour and disrupting traffic.

NAPA First Vice Chairman John S. Spangler of Milestone Contractors of Columbus, Indiana said that the sponsorship of the conference marks a trend toward greater cooperation in the asphalt paving industry. The conference was co-sponsored by NAPA, the State Asphalt Pavement Associations, and the Asphalt Institute in association with the Federal Highway Administration (FHWA), the American Association of State Highway and Transportation Officials (AASHTO), the National Association of County Engineers (NACE), Oregon Department of Transportation (ODOT), and Washington Department of Transportation (WSDOT).

"We have all come together to talk about how to build quality asphalt pavements," Spangler said. "Ten years ago customers and partnering were not in our vocabulary. We contractors were adversaries with the state ten years ago. All we cared about was building the pavement, getting paid, and moving on. The customer has higher expectations than that now. We have been able to deliver safety for the construction crew and safety for the driving public. We face challenges now from the no-growth people, and we

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need to overcome that by demonstrating that we can build in a customer-friendly way.

"We as contractors haven't done a whole lot to raise the consciousness level among our supervisors or workers to make us more customer-conscious," Spangler said. "We have to do more."

Speakers emphasized that "customer friendliness" begins with listening. "Engineers don't do a good job of listening to the public. They have to realize that the public can stop a project," said Donald Lucas, Deputy Commissioner and Chief Highway Engineer for the Indiana Department of Transportation. Lucas said customers want recognition, timely and accurate information, smooth roads, minimal delays, rapid repairs, and more permanent repairs. He noted that the FHWA's National Quality Initiative public opinion survey showed the "biggest dissatisfiers" were construction delays, unsafe roads, and congested roadways.

"Pavement Construction Under Traffic: Improving Production and Safety"

The importance of providing timely and accurate information was stressed repeatedly in the sessions on customer relations. In a session on "Pavement Construction Under Traffic: Improving Production and Safety," John Conrad of Washington State Department of Transportation described his agency's public relations success when they totally closed all lanes in one direction of Interstate 405 in Seattle for a weekend for final asphalt paving. The agency did a good job of notifying the public in advance that the freeway would be closed, and the public understood why the closure was necessary. A survey of 378 freeway users (19 percent of those contacted) revealed that the closure was actually popular. Eighty-seven percent of the respondents said they thought the closure was better than the option of having construction last longer, and 93 percent said they were aware in advance that the highway would close. The state legislature praised WSDOT for its handling of the project.

"Report of Customer Oriented Highway Construction Workshop."

Byron Lord, Chief of the Highway Infrastructure Division of the FHWA's Office of Technology Applications, presented the results of a 1997 workshop on "Customer Oriented Highway Construction" co-sponsored by the FHWA and NAPA. Workshop attendees representing a broad cross-section of the highway construction industry focused on customer relations, contracting, performance, and construction operations issues, and developed strategies and action items to accomplish goals in each area. (See NAPA Special Report 181: "Report of Customer Oriented Highway Construction Workshop." To order, phone 888-468-6499; fax 301-731-4621; internet www.hotmix.org; or e-mail napa@hotmix.org)

Accelerated Maintenance and Construction Operations

Due to the public's growing intolerance for the inconveniences of road work, accelerated maintenance operations and accelerated construction were hot topics at the conference. Contractors in the audience and speakers noted that worker burnout is a difficult challenge in accelerated construction operations. Maintaining safety and productivity during night operations is another major issue. During a panel discussion, there was a call for a national public/private initiative on accelerated construction. "New technology is focused on design and materials, but when we go to build, we don't have the ophistication in product delivery," Lord said. "TEA-21 requires us to consider possible topics for another Strategic Highway Research Program. Perhaps accelerated construction would be a good topic." The FHWA already has decided to develop a technology deployment initiative on accelerated construction maintenance operations.

Superpave

The latest technical developments in Superpave, smoothness, segregation, and quality control were covered in the portion of the agenda devoted to pavement quality and performance.

"The good news is that things are going well with Superpave," said NAPA Vice President for Research and Technology Dale Decker. "The direction Superpave is taking should lead us to better Hot Mix pavements."

Gayle King of Koch Materials Company, Wichita, Kansas, said new algorithms for designing Superpave mixes in very low-temperature environments have solved "one of the biggest problems in implementing Superpave."

King noted that there have been rutting problems with some Superpave mixes with polymer modifiers because the softening point and viscosity tests were not reliable. "Wheel tracking tests work, but only if you test under the same conditions (temperature, loading, etc.) as in the field," King said.

Use of Reclaimed Asphalt Pavement in Superpave

Jim Warren of the Asphalt Contractors Association of Florida discussed Florida's routine use of RAP (Reclaimed Asphalt Pavement) in Superpave. "Some of the most consistent materials we have in Florida are RAP, once it's processed," Warren said. "You've already processed the material once—you're just going to take it up and use it again." Careful materials characterization, materials handling, and mix design are the keys to successful use of RAP.

A Call for a Performance Prediction Test for Superpave Mixes

Ray Brown of the National Center for Asphalt Technology (NCAT) reiterated the industry's call for a performance prediction test for Superpave mixes. He noted, "The biggest problem with aggregate is meeting VMA requirements. To increase VMA the grading should be above the maximum density line. A single grade will meet VMA but may not have shear strength. We need a way to measure shear strength." Brown reported on the results of NAPA's Superpave Construction Survey, which were published in NAPA's
Superpave Construction Guidelines. (To order phone 888-468-6499; fax 301-731-4621; internet www.hotmix.org; or e-mail napa@hotmix.orq and ask for publication number SR-180.)

Superpave and Low Volume Roads

Brian Prowell of the Virginia Transportation Research Council discussed the use of Superpave for low-volume roads and base layers. There have been problems with achieving density on some low-volume roads because of low AC (Asphalt Cement) percentages. Fine mixes have been especially problematic, but proposed changes in the AASHTO specifications should help, he said. The N design table is being simplified from 4 climate levels by 7 traffic levels to 1 climate level by 5 traffic levels.

"Mix designers need to use the options Superpave allows—some designers like to stick with one mix design, but there are wide bands of aggregate gradations allowed," Prowell said. Often base layers are too dry, without enough asphalt, and segregation can occur. Prowell said changes in the Superpave specification will offer improvement, but there are still concerns over long-term durability in base layers.

"Contractors' Challenges to Obtain Smoothness"

In a presentation on "Contractors' Challenges to Obtain Smoothness," Don Popejoy of Ritchie Paving, Wichita, Kansas called for uniform national roughness criteria "so when we come together and talk about smoothness we have a common language." He emphasized avoiding "The Two Big Don'ts: Don't Stop the Paver, and Don't Bump the Paver." He said agencies need to recognize that quality costs time and money, and encouraged incentives. "Contractors would respond to rewards for increases in smoothness above minimum quality level. Nothing motivates a contractor like a bonus." Popejoy encouraged contractors to take greater responsibility for assuring road quality, particularly on rehab jobs. "You can't overlay over a crack-filled pavement that looks like a stained-glass window," he said. "Contractors need to press hard to make sure the paving solution meets the paving problem. We have a lot of public relations problems caused by band-aid fixes."

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Pavement Segregation

J. Don Brock, Chairman of Astec Inc., Chattanooga, Tennessee, said that the key word in understanding pavement segregation is uniformity. "If the mix is produced, hauled, and placed consistently, the result will be as the designer intended," Brock said. Most (70 percent to 75 percent) of segregation problems are "end-of-load" materials handling problems, where a non-uniform mix creates a weak spot, eventually leading to cracking, oxidation, and premature aging. Most of the remainder are centerline problems caused by pavers, although Brock discussed what he termed "a new type of segregation" related to temperature differences in the mix.

Don Watson of the Georgia Department of Transportation said that his agency condemns paving contractors if they produce persistent centerline segregation problems. His agency has reduced segregation as a percent of construction problems over the last two years from 21 percent to 6 percent through an aggressive quality control program. "It takes a tremendous amount of work, training, education, and a commitment to quality from everyone involved in production and placement," Watson said.

Kirk Randolph of APAC-Georgia, Atlanta, explained the detailed procedures his firm has instituted to produce segregation-free Hot Mix Ashalt (HMA).

"Controlling the HMA Production Process"

In a session on "Controlling the HMA Production Process," Larry Shively of United Asphalt Corporation in Thornville, Ohio explained how his firm has instituted an Advanced Quality Control Process that includes continual and detailed equipment calibration, and quality control on every job. "Once you get it implemented and get your people trained it's not so bad, and it can be used over and over," he said of his firm's quality control program. Training the technicians and giving them the authority to oversee the quality of plant operations is a key part of the program. "We give them the tools they need to keep the QC/QA process going. It is important for our customers. This is the future. The people who do not do this will not be the ones who are sought after," Shively said.

Ron Walker of the Indiana Department of Transportation explained his agency's very detailed QC/QA specifications and procedures.

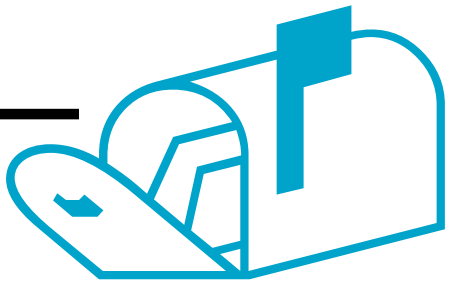
"Troubleshooting HMA Volumetrics"

In a presentation on "Troubleshooting HMA Volumetrics," NAPA's Dale Decker explained how to adjust materials, plant facilities, production, storage and handling to correct volumetric problems. Volumetric mix design addresses the balance that is needed in the mix to achieve sufficient space for binder while assuring enough aggregate structure to support loads. "VMA changes when you go through the plant process," Decker said. "Any relationship between mix design and field production is purely coincidental. Field management is the answer." (See NAPA Report, "Field Management of HMA." To order phone 888- 468-6499; fax 301-731-4627; internet www.hotmix.org; or e-mail napa@hotmix.org and ask for publication number IS-123).

Seventh Annual Hot Mix Asphalt Conference

The Seventh Annual Hot Mix Asphalt Conference will be held Oct. 27-29, 1999 at the Sheraton World Resort in Orlando, Florida.

Make Your Voice Heard!



Dr. Anna Bennett, LTAP Project Manager
Federal Highway Administration

In the coming months, the Federal Highway Administration (FHWA) is mailing a questionnaire to 2,400 local and tribal governments in the U.S. and Puerto Rico to help determine how to improve the services provided by the Local Technical Assistance Program (LTAP). LTAP is the federal program that funds the Northwest Technology Transfer Center, your LTAP center.

As part of this national study your agency may be one of the 2,400 to receive a copy of the short survey questionnaire. The questionnaire will ask about your agency's use of the training and technology transfer services offered through the Northwest Technology Transfer Center. Your response and those from the all of the other customers of the LTAP and TTAP (Tribal Technical Assistance Program) centers in the U.S. and Puerto Rico will be combined to assess the program's impact nationally.

It is very important that we receive your response to this survey! Future funding and ultimately the level of service offered by the Northwest Technology Transfer Center will be impacted by your response! This will be your chance to provide valuable feedback and influence a federal program designed to assist you. If you are a recipient, please answer and return it promptly in the postage-paid, pre-addressed mailer that will be provided. To help keep you informed, everyone who completes the questionnaire will receive a summary of the survey results planned for distribution in the fall of this year.

We appreciate your help in ensuring that LTAP provides the highest quality service possible.

If you have any questions or comments about this survey, contact Dr. Anna Bennett, FHWA's LTAP Project Manager, at Anna.Bennett@fhwa.dot.gov or (415) 744-2616.

Free Publications From Your T² Center

For Washington residents only.

Name _____

Agency _____

Address _____

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Check the items you would like to order.

___ Current Application and Successful Implementation of Local Agency Pavement Management in the United States, FHWA, 1997

___ Scrap Tire Utilization Technologies, NAPA

___ State-of-the-Art Survey of Flexible Pavement Crack Sealing Procedures in the United States, CRREL, 1992

___ Maintenance of Aggregate and Earth Roads, NWT² Center (1994 reprint)

___ International State-of-the-Art Colloquium on Low-Temperature Asphalt Pavement Cracking, CRREL

__ Geotextile Selection and Installation Manual for Rural Unpaved Roads, FHWA

___ Guide to Safety Features for Local Roads and Streets, FHWA, 1992

___ Family Emergency Preparedness Plan, American Red Cross, et al.

___ Getting People Walking: Municipal Strategies to Increase Pedestrian Travel, Rhys Roth, Energy Outreach Center

___ The Superpave System – New Tools for Designing and Building More Durable Asphalt Pavements, FHWA

___ A Guide to the Federal-Aid Highway Emergency Relief Program, USDOT, June 1995

___ Asphalt Seal Coats, T² WSDOT

___ Pothole Primer — A Public Administrative Guide, CRREL, 1989

___ Redevelopment for Livable Communities, Rhys Roth, Energy Outreach Center

___ A Guidebook for Residential Traffic Management, NWT² Center, 1994

___ A Guide for Student Pedestrian Safety, KJS, 1996

___ A Guide for Local Agency Pavement Managers, NWT² Center, 1994

___ Local Agency Pavement Management Application Guide, NWT² Center, 1997

___ Positive Guidance and Older Motorists — Guidelines for Maintenance Supervisors, Texas A&M

___ Planning, Design, and Maintenance of Pedestrian Facilities, FHWA, 1989

___ Traffic Calming: A Guide to Street Sharing

___ Basic Metric System, WSDOT

___ The Impact of Excavation on San Francisco Streets. This study evaluates the impacts utility cuts have done to the street and road network. September 1998

___ Rating Unsurfaced Roads, CRREL A Field Manual for Measuring Maintenance Problems

___ The Pedestrian Facilities Guidebook, otak/WSDOT

Workbooks and Handouts From T2 Center Workshops

___ Access Management, Location and Design, FHWA/NHI, 1998
___ Access Management Guidelines for Activity Centers, NCHRP Report 348, TRB/NRC, 1992
___ Handbook for Walkable Communities, by Dan Burden and Michael Wallwork
___ Geosynthetic Design and Construction Guidelines, National Highway Institute
___ Planning and Implementing Pedestrian Facilities in Suburban and Developing Rural Areas, TRB
___ Part VI, Standards and Guides for Traffic Controls for Street and Highway Construction, Maintenance, Utility, and Incident Management Operations
___ Historic and Archeological Preservation: An Orientation Guide, FHWA/NHI

Self-Study Guides

The following noncredit self-study guides are available through WSDOT Staff Development and can be obtained from the T2 Center. An invoice will be sent with the books.

___ Technical Mathematics I, $20
___ Technical Mathematics II, $20
___ Contract Plans Reading, $25
___ Basic Surveying, $20
___ Advanced Surveying, $20

Orders may be faxed, mailed, or phoned to
Laurel Gray
Phone: (360) 705-7386
Fax: (360) 705-6858
Mailing Address: NWT2 Center, WSDOT
TransAid P.O. Box 47390
Olympia, WA 98504-7390

Computer Programs

The following computer programs may be downloaded from the Internet at *http://www.wsdot.wa.gov/TA/T2/computer.htm*

Design Cost Estimate. A software database program that calculates cost projections based on standard items.

Materials Approval Tracking. A software program designed to track materials data, need, status, and approval of any materials sampling and documentation needed for approval.

HyperCalc. A shareware utility for converting between metric and English units.

Force Account Macros. A series of ready-made Excel spreadsheets and macros to save you time on daily force account calculations and reports, including wage and equipment rates.

APWA CAD Symbol Standards and Menus. A public domain program of standard AutoCAD symbols developed by the Washington Chapter of APWA for use with AutoCAD release 12.

Microsoft Access Runtime Program. Assists in running the Materials Approval Tracking and Design Cost Estimate Program.

UTEC System. A software program consisting of a main menu designed to provide a record base for identifying street locations within an agency.

Opportunities to Enhance Your Skills

For more information, contact the training provider listed. For additional training needs contact the Northwest T² Center at (360) 705-7386 or 1-800-973-4496.
http://www.wsdot.wa.gov/TA/T2/T2HP.htm

Workshops

NWT² Center
Contact Laurel Gray, T² Center, WSDOT/
(360) 705-7386, Fax (360) 705-6858
http://www.wsdot.wa.gov/TA/T2/train.htm

WSBIS Training
(formerly SWIBS)
February 22-25, 1999 – Lacey Community Center, Lacey
This class provides an explanation of the coding inspection and inventory forms associated with the Washington State Bridge Inventory System (WSBIS). There will be a demonstration of the WSDOT Laptop Bridge Inspection Program and installation instructions. For bridge condition inspectors. No fee.

Bridge Condition Inspection Training (BCIT I & II)
(formerly Safety Inspection of In-Service Bridges)
March 8-12, 1999 – Lacey Community Center, Lacey
March 22-26, 1999 – Lacey Community Center, Lacey
This is a two-week course based on the updated *"Bridge Inspector's Training Manual 90"* and will provide extensive training on the condition inspection of in-service bridges. This class is for new bridge inspectors or those who desire a complete refresher. No fee.

Statewide Bridge Supervisor's Forum
(formerly Statewide Bridge Supervisor's Meeting)
March 16-18, 1999 – Shilo Inn, Ocean Shores
This forum is intended for supervisors and their crew who perform the repair and maintenance on bridges. There will be open discussion on bridge related problems and a chance to learn how others address those problems. No fee.

Bridge Condition Inspection Update, Reporting (BCIU(R))
(formerly Bridge Inspection Refresher)
April 5-6, 1999 – Mats Lab, Tumwater
April 7-8, 1999 – Yakima
April 12-13, 1999 – Everett
April 15-16, 1999 – Spokane

This update course will provide information on the new inspection manual, laptop bridge inspections, and other important bridge inspection issues. A focus in this seminar is the distribution of a laptop inspection program for electronic reporting of WSBIS inventory and inspection data. This class is for local agency experienced bridge inspectors. No fee.

Quality Awareness Training
Instructors: Katherine Klockenteger and Pat Morin, WSDOT. Four hours of training. March 24, Seattle; March 31, Olympia; April 7, Everett; April 14, Yakima; April 21, Spokane. This class is an introduction to quality management and quality improvement. The class will address basic Total Quality Management (TQM) philosophy and techniques to make improvements at all levels of an organization. Students will gain an understanding of quality tools and principles, customer/supplier relationships, and necessary costs versus avoidable costs. No fee.

Roundabout Training
Instructor: Darlene Sharar, WSDOT/T2 Engineer.
June 2, Olympia; June 17, Wenatchee; November/December timeframe for a Roundabout Conference (Michael Wallwork will be one of the featured speakers). This class will discuss roundabout design guides (currently the guides are being written) established by local agency and WSDOT. No fee.

De-Icer Workshop
Instructor: Dale Keep, WSDOT – nationally recognized authority on de-icing. Three hours of training. April 21, Seattle; April 22, Everett; May 13, Vancouver; June 1, Yakima; June 2, Spokane; June 3, Walla Walla. $25.

Toolkit for Pedestrian Design
Instructors: Consultants Dan Dawson and Mandi Roberts of Otak. October 6, 13, 19, 27 – Everett,

South Seattle, Vancouver, Yakima. A one-day session at each location. Instruction will be based on the "Pedestrian Facilities Guidebook." $25.

Coming this year:

Pavement Condition Rating Workshops
Paul Sachs, Instructor. April/May/June. Tacoma, Moses Lake.

Welding Classes
Back again by popular demand. Tom Cook, Instructor. April/May. Spokane, Tacoma, Vancouver, Yakima, Everett.

Contract Administration
FHWA and DOT will instruct. September/October.

WSDOT, Staff Development
Local Agencies should call Laurel Gray in the T² Center to register (360) 705-7386

The 14 courses listed below are offered in various locations around the state whenever enough interest warrants scheduling a class (some classes might already be scheduled). You may call the T2 office and have names put on request lists. You will be notified when a class has been scheduled and your name included on the roster. A description of the classes can be faxed to you. No fee.

- PCC Field Testing Procedures (ABT)
- Aggregate Production Inspection (ACA)
- Asphalt Paving Street Inspection (ACB)
- Bituminous Surface Treatment Inspection (ACC)
- Drainage Inspection (ACF)
- Bridge Structures Inspection (ACM)
- Miscellaneous Documentation (ACY)
- Excavation and Embankments Inspection (AC3)
- Nuclear Gauge, Operator Qualification (ALG)
- Nuclear Gauge, Overview for Supervisors (ANE)
- Nuclear Gauge, Embankment/Surfacing/Pavement Applications (ANQ)
- PCC Pavement Production and Placement (APG)
- Electrical-Illumination and Signals (API)
- Asphalt Concrete Pavement Testing Procedures (BG9)

Contract Plans, Specifications, and Estimate Preparation (PS&E) (A4J)
Contract Special Provision Writing (B6N)
Instructor: Jon Cox, WSDOT. PS&E is a two-day class and includes the Contract Special Provisions Writing class. The first day will cover the PS&E portion dealing with the most recent requirements for preparing complete, biddable, constructable, and defensible plans. The second day covers contract special provision writing. Contract Special Provision Writing: This one-day class is recommended for all designers and design team leaders who have taken the PS&E course within the last few years. It will cover the most recent requirements for writing complete, concise, and well-formatted special provisions. No fee.

WSDOT, Environmental Affairs Office
Contact Jim Sundahl
(360) 705-7483

Certification in Construction Site Erosion and Sediment Control (BPW)
February 23-24, King County; March 9-10, Ellensburg; March 23-24, Spokane; April 7-8, Skagit County; April 20-21, Kitsap County. $125.

University of Washington Professional Engineering Practice Liaison (PEPL)
(206) 543-5539, Fax (206) 543-2352
http://www.engr.washington.edu/~uw-epp/Epp/upsc.html

All classes are held on or near the University of Washington campus in Seattle. Prices indicate early registration/late registration.

To register for a course, please call Engineering Professional Programs at the number above. Early registration fees are applicable up until two weeks before the date of the course.

Effective Writing for Technical Professionals
February 25 and March 2, 4, 9 and 11(five sessions), 3:30 p.m. - 6:30 p.m., UW, Seattle. Course Topics: After completing this course, you should be able to integrate the writing process with other professional responsibilities, refine your composition and revision skills, assess your audiences needs and tailor your documents accordingly, choose an effective organization pattern for your audience and purpose, use appropriate form and layout, define and enhance your professional writing style, apply conventional grammar principles, choose a tone appropriate to your message, and improve

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the management and review of documents. $320/$345.

Groundwater Monitoring for Water Purveyors
March 17-18, 8:30 a.m. - 4:30 p.m., UW, Seattle. Course Topics: Introduction to hydrogeology; reasons for installing and sampling a monitoring well system; appropriate design and use of monitoring wells; field procedures and equipment, including sampling tools, methods, and maintenance of sample integrity; data management and quality assurance, with a discussion of available software; evaluation of costs for installing and utilizing a monitoring well system. $345/$375.

Alternative On-Site Stormwater Management Techniques
March 25-26, 8:30 a.m. - 4:30 p.m., UW, Seattle. Course Topics: Urban hydrology issues and benefits of on-site runoff control (demonstrated hydrology of a small forested catchment, response from a similar catchment after urbanization, measurements demonstrating potential benefits from soil amendments, quantification of potential on-site management techniques from two urban developments in Japan, one with conventional treatment and one with on-site infiltration methods), field trip, opportunities for on-site stormwater management (alternative landscape arrangements to minimize runoff production, specification of compost for use as a soil amendment, selecting size and dimensions for infiltration trenches and dry wells). $345/$375.

Stormwater Treatment by Media Filtration
April 7-8, 8:30 a.m. - 4:30 p.m., UW, Seattle. Course Topics: Advantages and limitations of media filtration, origins of filtration as a unit process, configurations in use today, performance in comparison to other BMPs, performance as affected by stormwater characteristics, relevant engineering principles (filtration, nitrification, settling), pretreatment, types of media (characteristics and specifications; sand, compost, peat; media on the horizon), sizing pretreatment and filter units (King County, Department of Ecology), design and construction, maintenance needs and procedures, construction and maintenance costs, field trip to local filtration system sites. $345/$375.

Quaternary and Engineering Geology of the Central and Southern Puget Sound Lowland
April 15-17, 8:30 a.m. - 4:30 p.m., UW, Seattle. Course topics: quaternary history; evolution of landforms; glacial and interglacial depositional environments; stratisgraphy and lithology; regional stratisgraphic correlation; structure and tectonics; engineering properties of geologic materials; current research (mapping, landslide inventories, paleomagnetic studies, radiocarbon dating, tephrochronology); sources of geoscience information; applications (slope stability, groundwater and contaminant migration, seismic response of near-surface materials, volcanic hazards); field trip. $380/$420.

Design and Retrofit of Culverts for Fish Passage in the Northwest
May 12-13, 8:30 a.m. - 4:30 p.m. Specifically oriented to areas of the country where design of roadway culverts must provide accommodations for fish passage, rather than using allowable headwater as the primary design factor. Topics include legal requirements for fish passage, identification of types of fish passage barriers, applicable hydrology and hydraulics, culvert inventory issues and factors, fish swimming and leaping capabilities, and basic methods for restoring fish passage. Lecture notes and visual materials augmented by actual case histories and specific design examples. $345/$375.

TRANSPEED, University of Washington
Contact Julie Smith
(206) 543-5539, Fax (206) 543-2352
http://www.engr.washington.edu/~uw-epp/Transpeed/index.html

Legal Liability for Transportation Professionals
March 10-11, Seattle. $150 /$300.

Hydrology and Basic Hydraulics
March 18-19, Seattle. $150/$300.

Traffic Engineering Tools and Procedures
March 25-26, Seattle. $150/$300.

Design and Application of Roadway Safety Features
March 30-April 1, Seattle. $180/$350.

Winter/Spring 1999 Schedule

Managing Transportation Project Delivery
March 2-4, April 7-9, July 7-9

Design and Application of Safety Features
March 3-5

Advanced Roadway Geometric Design
April 7-9, June 16-18

Traffic Engineering Module I
April 14-16

Roadway Culvert Hydraulic Design
April 27-28

Managing Construction Schedules
May 5-6

Roadway Value Engineering
May 11-13

Traffic Engineering Module II
May 12-14

Basic Highway Capacity for Engineers and Planners
May 19-21

Basic Geometric Design
June 2-4

Legal Liability
June 22-23

Advanced Highway Capacity Analysis
August 25-27

Conferences and Meetings http: //www.wsdot.wa.gov/TA/T2/conf.htm

50th Annual Road Builder's Clinic
March 9-11, Coeur D'Alene, Idaho. Information: WSU Conferences and Institutes (509) 335-3530, 1-800-942-4978, fax (509) 335-0945.

ITS99 – ITS America Ninth Annual Meeting
April 19-22, Washington Marriott Wardman Park Hotel, Washington D.C.

APWA Spring Conference
"Edge of the Millennium – Ride the Wave"
April 27-30, Shilo Inn and Ocean Shores Convention Center, Ocean Shores, WA. Registration information will be mailed in January. Contact Jean Rice at (425) 556-2715 or jrice@ci.redmond.wa.us. Vendor exhibitors contact Tom Dozal (253) 840-5505. For information on the Conference program call Program Committee members Katherine Claeys at (206) 684-8175 or Mike Terrell at (425) 454-5600. Keynote speakers: Phyllis Campbell, President of the US Bank of Washington and Robert Miller, President of the National APWA.

APWA's Annual Conference
"1999 International Public Works Congress and Exposition"
September 19-22, Denver, Colorado. Contact Cheryl McOsker at (816) 472-6100 x3521 or e-mail cheryl mcosker@mail.pubworks.org.

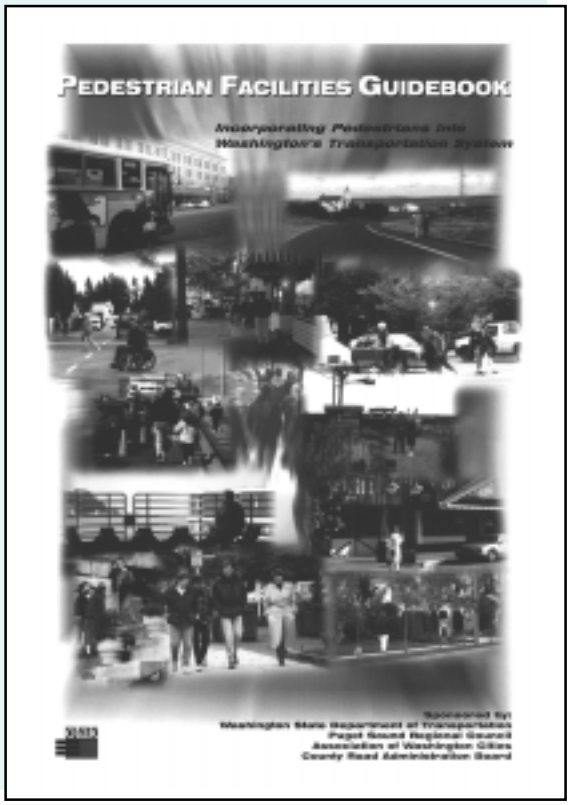
Road and Street Maintenance Supervisors' School East
October 5-7, Doubletree Hotel Spokane Valley, Spokane, WA.

International Conference on Accelerated Pavement Testing
October 18-20, Reno, Nevada. First announcement and call for papers. Information: Maria Ardila-Coulson, Director, Nevada T2 Center/257, University of Nevada, Reno, NV 98557, Phone (702) 784-1433, fax (702) 784-1429, email maria@unr.edu.

Pedestrian Facilities Guidebook Available!

The Pedestrian Facilities Guidebook has been reprinted and copies are now available! Published by WSDOT, the Guidebook provides guidance in planning and design of a wide range of pedestrian facilities. It presents eleven "toolkits" that discuss specific areas of pedestrian facilities. It also provides general information about the characteristics of pedestrians, and a resource guide.

Classes based on the Guidebook are planned for later in the year with the consulting firm of Otak teaching the classes. The Guidebook wss written by Otak in association with WSDOT, the Puget Sound Regional Council, Association of Washington Cities, and the County Road Administration Board. Copies of the Guidebook are available to local agencies within Washington State free of charge and $12.00 to any agency outside Washington. Call (360) 705-7386 to order, or use the form on page 40.

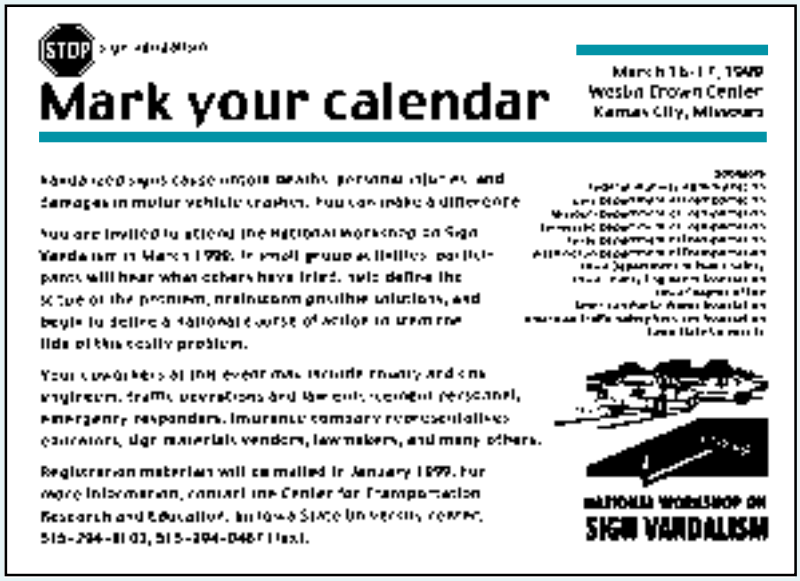


Center for Transportation Research and Education

ISU Research Park

2625 N. Loop Driv, Suite 2100

Ames, IA 50010-8615



Walkable Communities: Designing for Pedestrians

Videotape of the class by Dan Burden. Four tapes, 5.5 hours. Available for purchase ($75) or can be borrowed by local agencies. Call T2 Center for further information (360) 705-7386 or grayl@wsdot.wa.gov.

Now Available!

General Field Reference Guide — $2.75 each

To order your Field Guides, specify quantity desired and enclose check made payable to WSDOT/T2 Center. Questions? Call (360) 705-7386.

Name _____

Agency _____

Address _____

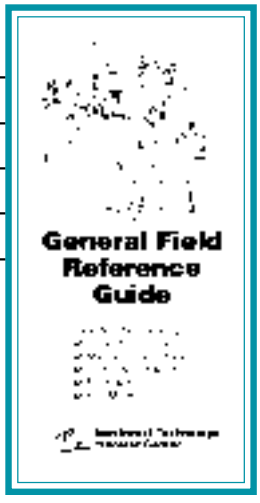
City/Zip _____

Phone _____

Total number Field Guides requested _____.

Mail to:

WSDOT/T2 Center
Attn: Laurel Gray
PO Box 47390
Olympia, WA 98504-7390



Northwest Technology Transfer Center
WSDOT-TransAid Service Center
P.O. Box 47390
Olympia, WA 98504-7390

Address Service Requested

A newsletter of the Local Technical Assistance Program (LTAP)

T² Bulletin

Issue Number 61, Winter 1999

The Local Technical Assistance Program (LTAP) is a national program financed by the Federal Highway Administration (FHWA) and individual state transportation departments. Administered through Technology Transfer (T²) Centers in each state, LTAP bridges the gap between research and practice by translating state-of-the-art technology into practical application for use by local agency transportation personnel.

Any opinions, findings, conclusions, or recommendations presented in this newsletter are those of the authors and do not necessarily reflect the views of WSDOT or FHWA. All references to proprietary items in this publication are not endorsements of any company or product.

Washington State Department of Transportation
TransAid Service Center

U.S. Department of Transportation
Federal Highway Administration